Replacement of poliovirus as test virus for efficacy evaluation of disinfection

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INTRODUCTION & AIM

As part of its global eradication programme, the WHO aims to eliminate the poliovirus from testing procedures altogether. For this reason, it will only be available as a test virus for European standard testing of disinfectants for a limited period of time.

Working Group 5 (WG5) of the European Committee for Standardisation (CEN/TC216) organised a ring test in collaboration with the Association for Applied Hygiene (VAH) to identify an alternative to the poliovirus.

Encephalomyocarditis virus (EMCV) strain Hungary and coxsackie virus B5 (CVB5), which are both in the same family of picornaviruses, were selected as potential alternatives for the ring test.

METHOD

The comparative inactivation studies were conducted by 10 different international laboratories in quantitative suspension tests in accordance with EN 14476[1]. The tests were carried out at 20 °C ± 1 °C with 0.3 % BSA as the interfering substance (clean conditions). The respective approaches were evaluated using endpoint titration in a microtiter procedure, with the titres calculated according to Spearman[2] and Kearber[3]. The virus-inactivating efficacy of a test substance was then assessed by subtracting the determined titres from that of the virus control carried out with water. This difference was expressed as a reduction factor (RF) with a 95 % confidence interval.

An overview of the test substances and the individual test parameters is shown in table 1.

Tab.1: Overview of test substances and test parameters for the ring test

Test substances [concentrations]	Incubation time(s)
peracetic acid (PAA) [250 ppm]	30 min
hypochlorous acid [150 ppm]	10 min
glutaraldehyde (GA) [500 ppm]	30 min
1/2-propanol* [80 % + 97 %]	120 s
75 % (w/w) ethanol [80 % + 97 %]	30 s
85 % (w/w) ethanol [80 % + 97 %]	30 s

*30 % (w/w) 1-propanol + 45 % (w/w) 2-propanol

RESULTS

The results of the comparative study showed no significant differences among the three viruses under the selected test parameters for the alcohol, glutaraldehyde and PAA formulations. However, when hypochlorous acid was used at a concentration of 150 ppm for 10 minutes, the mean RFs of poliovirus (4.65 lg) and CVB5 (4.96 lg) were similar. In contrast, with EMCV only a reduction of 1.30 lg could be achieved (see table 2 and figure 1).

Tab.2: Overview of the results of the ring test (evaluation by K. Roesch, VAH)

Test substance	Parameter	CVB5		EMCV		Polio	
1/2-propanol	**Labs**	**4**		**5**		**5**	
	test con.	80 %	97 %	80 %	97 %	80 %	97 %
	lg RF	0,39 ± 0,73	0,24 ± 0,58	0,09 ± 0,37	0,16 ± 0,48	0,00 ± 0,39	1,24 ± 1,22
75 % ethanol	**Labs**	**8**		**9**		**7**	
	test con.	80 %	97 %	80 %	97 %	80 %	97 %
	lg RF	0,70 ± 0,55	1,12 ± 0,90	0,34 ± 0,20	1,23 ± 0,28	0,42 ± 0,13	0,86 ± 0,68
85 % ethanol	**Labs**	**8**		**9**		**7**	
	test con.	80 %	97 %	80 %	97 %	80 %	97 %
	lg RF	1,05 ± 0,75	2,42 ± 1,26	0,74 ± 0,26	1,95 ± 0,73	0,93 ± 0,44	2,97 ± 0,99
glutaraldehyde [500 ppm]	**Labs**	**7**		**8**		**7**	
	lg RF	1,62 ± 0,31		1,86 ± 0,67		2,38 ± 0,93	
peracetic acid [250 ppm]	**Labs**	**8**		**9**		**7**	
	lg RF	2,76 ± 0,67		1,60 ± 0,23		2,04 ± 0,57	
hypochl. acid [150 ppm]	**Labs**	**8**		**9**		**7**	
	lg RF	4,65 ± 0,47		**1,30 ± 0,45**		4,96 ± 0,75	

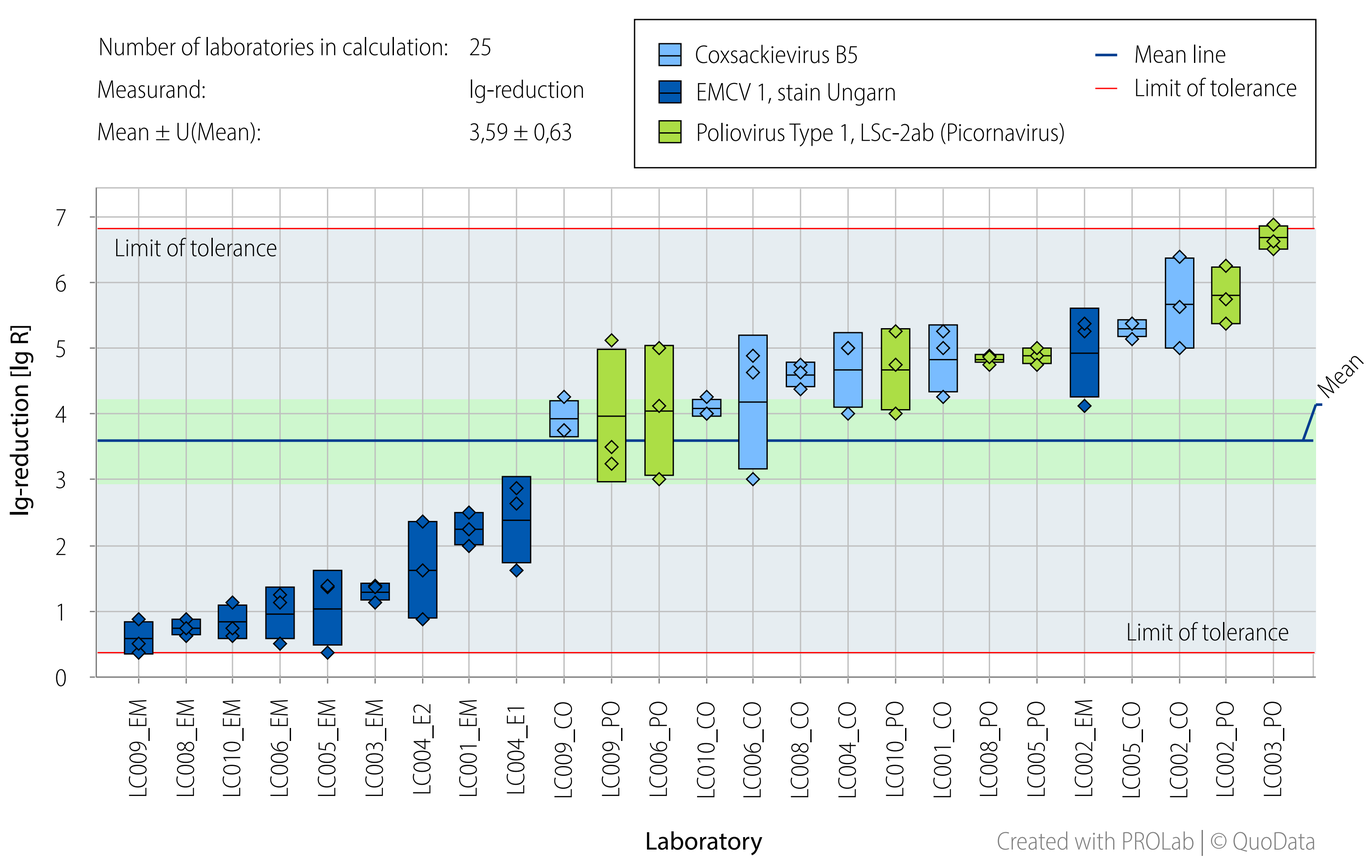

Fig.1: Graphical representation of the results from the ring test with hypochlorous acid (graph created by K. Roesch, VAH).

CONCLUSIONS

Based on the results presented here, both viruses show a good comparison with poliovirus. However, due to the results on hypochlorous acid, coxsackie virus B5 seems to be a superior alternative for poliovirus compared to EMCV.

REFERENCES

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DISCLOSURE OF INTEREST

None Declared